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IS 11713-2 (1986): Guide for physical planning of computer complexes, Part 2: Safety [LITD 14: Software and System Engineering]



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GUIDE FOR PHYSICAL PLANNING OF  
COMPUTER COMPLEXES

PART 2 SAFETY

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*Indian Standard*GUIDE FOR PHYSICAL PLANNING OF  
COMPUTER COMPLEXES

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## *Indian Standard*

# GUIDE FOR PHYSICAL PLANNING OF COMPUTER COMPLEXES

## PART 2 SAFETY

### 0. FOREWORD

**0.1** This Indian Standard ( Part 2 ) was adopted by the Indian Standards Institution on 23 January 1986, after the draft finalized by the Computers, Business, Machines and Calculators Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

**0.2** Normally computer installations are located in cities and townships where protection from hazards, such as fire, floods, etc, is invariably provided due to the regulations imposed by the city authority. However, it is possible that even within city limits these hazards have caused untold damage to offices and other equipment. In the case of computer installations in particular, the extent of damage due to hazards can be very huge to the organization mainly because of the fact that the operations of the organization could come to a stand still if large scale damage is caused to the computer hardware as well as to the data stored in the storage devices.

**0.3** While the actual advent of a natural hazards cannot be predicted with any accuracy whatever, what can be done by the computer centre management is to take steps to prevent the occurrence of such natural hazards in the first instance. Later, when such hazards actually take place, to minimize the extent of damage. Also, it would be advisable to make efforts to retrieve as much data and equipment as possible belonging to the computer installation in case hazards occur.

Due attentions must also be paid to the fact that while hazards such as fire should be handled expeditiously, chemicals used for extinguishing fire should be such that they should not cause any harm to the personnel working in the computer environment at the time the fire breaks out.

**0.4** An attempt is being made in this standard to bring together various aspects including reference to other standards which will have a bearing on how to handle hazardous situations in computer installations.

## 1. SCOPE

**1.1** This standard ( Part 2 ) provides guidelines for safety measures in computer installations from hazards, such as fire, flood, earthquakes, magnetic fields, pests and rodents.

NOTE — For the purpose of this standard, ' Safety ' means provision of protection against damage or loss to personnel and equipment.

## 2. FIRE

**2.0** Fire may occur in a computer installation due to a number of reasons ranging from a simple spark to deliberate sabotage. Among all hazards, fire is the most commonly found one and causes the maximum damage. Adequate measures must, therefore be taken in every computer installation against this hazard. The measures that may be taken are discussed here.

### 2.1 Preventive Measures

**2.1.1 Selection of Site — Some Suggestions** — As a guiding principle, computer installations should preferably be located away from hazardous environments such as chemical, plastic, paint, petroleum and similar industries. In case a computer installation is expected to be located within such an industrial complex, then extra precautions must be taken to protect the computer installation from fire hazards.

**2.1.2 Construction of the Building — Some Guidelines** — In order to ensure that the computer room is well protected from fire, it is advisable that the frames of the structure, floors, walls and roof should be built from non-combustible material. The computer room should also be separated from the adjoining area by double fire doors. With regard to the walls, flooring, ceiling and partitions, fire retardant materials should be used and in no event whatever should expanded polystyrene ( thermocol ) should be used.

Orders must be very clearly stated as well as implemented to the effect that no smoking should be permitted in or around the computer room and the storage area in order to prevent fire hazards.

**2.1.3 Storage of Records** — Magnetic tape and other records should be stored in fire-proof rooms. In addition, magnetic storage media such as tapes, disks, etc, must be kept in fireproof and heat insulated containers or cabinets.

**2.1.4 Electrical Wiring** — Since overload may cause fire, all wiring should be periodically checked for its capacity to carry the required electrical loads. Also, all fuses must be of sufficiently low amperage rating in order that the circuit may be protected in case of short circuit or overload.



## 2.2 Detection Measures

**2.2.1** Wherever possible, an automatic fire detection system must be installed. The detection system should indicate all failures including power failure on a control panel with a built-in alarm system which should alert security personnel. The location and spacing of detectors would be dependent on the following factors:

- a) Potential fire sites,
- b) Location of equipment, and
- c) Direction and valocity of flow of air.

**2.2.2** For detecting fire, it would be preferable to install smoke detection systems in areas where electronic equipment are located in preference to air temperature detection equipment since false alarms may be raised even during normal times of operation of such electronic equipment, heat generated by which may raise false alarms.

## 2.3 Recovery Measures

**2.3.1 Fire Fighting Equipment** — In every computer complex, suitable fire fighting equipment as per Indian Standard must be provided. It is preferable to provide portable fire extinguishers. Even though chemical fire extinguishers are useful for putting out fire at critical places where hardware, disk or tape is located, such extinguishers may cause injury to personnel. Therefore, adequate precautions must be taken while using such extinguishers and, personnel should be alerted and informed through hailers when necessary.

**2.3.2 Guidelines for Fire Control** — Apart from the normal measures taken to prevent and control fire which may occur, appropriate guidelines and regulations must be formulated. Personnel working in the complex must also be trained in such guidelines and each person must be aware of his duties in the even of a fire. Some of the sample elements to be covered in the guidelines are mentioned at Appendix A.

## 3. FLOOD

**3.1** While it is an acknowledged fact that the planner of the computea complex would have taken adequate steps to locate it away from flood-prone areas, it is quite likely that dampness may be caused due to sewage or water mains which may pass close to the walls of the computer complex. Thus, damage due to dampness may occur more often than due to flood. It is also possible that floods may result from heavy rains.

**3.2** With a view to preventing damage due to dampness and flooding, drainage and water pipes should preferably be routed away from the hardware area. Further, the walls, flooring and roofing of the computer room should be periodically inspected to detect dampness and leakage of water.

3.3 All structures of the computer installation should be provided with water proofing treatment as per standards laid down in IS : 3067-1966\*.

#### 4. EARTHQUAKES

4.1 Earthquakes, whether they are of a violent nature or otherwise can cause extensive damage to the computer equipment. Even mild tremors may cause fall of debris on the computer equipment causing extensive damage. Therefore, wherever possible, location such as hillside land filled areas and tall structures should be avoided.

#### 5. LIGHTENING

5.1 As a rule, all tall buildings are provided with lightening conductors. In respect of computer installations, however, even if the building is not too tall, it is preferable to provide lightening conductors as per IS : 2309-1969†. The earth provided for lightening conductors should be kept away from the building's earth.

#### 6. ELECTRO-MAGNETIC FIELDS

6.1 Very strong electro-magnetic fields may cause errors in the performance of computers and also in the data stored on magnetic media. In order to prevent damage due to heavy magnetic fields, the computer complex should be located away from TV/Radio stations, micro wave stations, heavy electrical equipment, etc.

6.2 The electro-magnetic radiations found in the computer complex should be measured periodically and should be maintained below the following limits:

	<i>Below Field Strength of</i>	<i>Frequency Range</i>
a) Pulsed type radiation ( Broad Band )	200 millivolts/meter per megahertz band width	150 kHz 400 MHz
b) Continuous wave radiation ( Narrow Band )	300 millivolts/meter	150 kHz 400 MHz
c) Continuous wave	300 millivolts/meter	150 kHz 400 MHz

6.3 In case location of a computer complex in an electro-magnetic induction area is unavoidable, the following must also be provided:

- wire mesh as a Faraday cage or walls surrounding the installation;

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\*Code of practice for general design, details and preparatory work for damp-proofing and waterproofing of buildings.

†Code of practice for the protection of buildings and allied structures against lightning ( *first revision* ).

- b) Aluminium mesh screening of the windows facing the radar antenna; and
- c) Grounding window screens and other leakage metal surfaces.

## 7. ELECTROSTATIC CHARGE

7.1 Computer hardware is highly susceptible to electrostatic damage. Electrostatically safe environment can be provided through the use of floor and table mats and wrist straps for maintenance staff. The purpose of the floor mat is to remove the static charge from transient personnel who approach the static sensitive environment. The conduction table mat, besides providing static free work surface, removes static charge from non-conducting items placed on it. Non-conducting objects such as persons, trays, containers, cups, etc, acquire electrostatic charge with potential difference as much as 10 kV to cause serious damage. The precautions as laid down in IS : 10087-1981\* should be observed and accordingly facilities may be provided in maintenance area.

## 8. PESTS AND RODENTS

8.1 Pests and rodents can be a cause of considerable damage to electrical installation and hardware. Adequate measures for pest and rodent control as per relevant Indian Standards are recommended.

# APPENDIX A

( Clause 2.3.2 )

## SAMPLE ELEMENTS TO COVER IN REGULATIONS FOR FIRE FIGHTING

- a) Officers authorized and the chain of command ( one executive must be designated specifically as a fire officer ).
- b) Telephone numbers for contact in case of emergency.
- c) Display of telephone numbers of firebrigade, hospitals and concerned officers.
- d) Instructions for contact and emergency steps for fire fighting, evacuation of persons, preventive and salvage instructions for the equipment and other valuable goods.
- e) Checking of equipment once every three months — instructions for these should be drawn.
- f) Training of staff and drills ( at least once in three months ) for fire fighting, first aid, etc.
- g) Availability and access to fire fighting equipment and regulation at all times.

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\*Code of practice for handling of electro-static sensitive devices.

## INTERNATIONAL SYSTEM OF UNITS ( SI UNITS )

### Base Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

### Supplementary Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
Plane angle	radian	rad
Solid angle	steradian	sr

### Derived Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>	<i>Definition</i>
Force	newton	N	1 N = 1 kg.m/s <sup>2</sup>
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.S
Flux density	tesla	T	1 T = 1 Wb/m <sup>2</sup>
Frequency	hertz	Hz	1 Hz = 1 c/s(s <sup>-1</sup> )
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m <sup>2</sup>